

Centers For Learning and Teaching: (CLT)

Program Solicitation

NSF-02-038

DIRECTORATE FOR EDUCATION AND HUMAN RESOURCES
DIVISION OF ELEMENTARY, SECONDARY, AND INFORMAL EDUCATION
DIVISION OF UNDERGRADUATE EDUCATION
DIRECTORATE FOR ENGINEERING
DIRECTORATE FOR MATHEMATICAL AND PHYSICAL SCIENCES

PRELIMINARY PROPOSAL DUE DATES(S) (*required*): March 15, 2002

FULL PROPOSAL DEADLINE(S): May 3, 2002



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SUMMARY OF PROGRAM REQUIREMENTS

GENERAL INFORMATION

Program Title: Centers For Learning and Teaching: (CLT)

Synopsis of Program:

The Centers for Learning and Teaching (CLT) program is a comprehensive, research-based effort that addresses critical issues and national needs of the science, technology, engineering, and mathematics (STEM) instructional workforce across the entire spectrum of formal and informal education. Combined with new approaches in assessment, research on learning, curriculum and materials development, and research-based instructional methodologies, the CLT program will build the intellectual infrastructure needed to ensure high-quality, standards-based learning opportunities in STEM for all students.

Elementary, Secondary, and Informal Education Centers

Centers with a programmatic focus on elementary, secondary, or informal education will provide a rich environment that melds research, teacher education, and education practice. Individual Centers may have specific foci (e.g., K-6 science, large-scale assessments, learning of mathematics), but each will address the following three equally important components: enhancing the content knowledge and pedagogical skills of current and future elementary and secondary teachers; rebuilding the STEM education infrastructure, particularly the higher education faculty who educate STEM teachers and the leadership cadre operating in state and district-level and other education organizations; and supporting research into relevant aspects of STEM education. The CLT effort builds upon previous activities in the preparation and professional development of teachers and provides opportunities for graduate students and post-doctorates in the disciplines and in STEM education to acquire the knowledge and skills to educate the next generation of K-12 teachers.

Elementary, Secondary, and Informal Education Center proposals must involve partnerships of organizations with a scientific, engineering, and/or educational mission. Among these are two- and four-year colleges and universities, state and local education agencies, professional societies, research laboratories, informal science centers, instructional materials development centers, private foundations, and/or other public and private organizations (whether for profit or nonprofit). Each Center must have one or more school district partners, as well as a partner that is authorized to award doctoral degrees in an appropriate area. Where possible, Centers should have collaborative relationships with NSF systemic initiatives (i.e., state, urban, rural, local).

Higher Education Centers

New this year are prototype Higher Education Centers that will provide a nucleus for coordinated efforts to reform teaching and learning at the nation's colleges and universities through a rich blend of research, faculty professional development, and education practice. Centers will provide faculty professional development for future and current faculty to enable all undergraduate students to experience effective teaching practices and exemplary educational materials. Centers will build on previous efforts to reform undergraduate and graduate education and will support educational research focusing on STEM postsecondary education. Individual centers may focus on a specific discipline or interdisciplinary approaches, but each Center will address three equally important components: enhancing the content knowledge and pedagogical skills of current and future faculty; building the infrastructure of higher education faculty as a community of educators who prepare and sustain STEM educators; and supporting research into STEM higher education, spanning baccalaureate through graduate levels.

Higher Education Centers must involve partnerships that include at least one implementation site (two- or four-year college) and one partner must have authorization to grant STEM doctoral degrees. Other partners may include school districts, state and local education agencies, professional societies, research laboratories, private foundations, informal science education centers, business and industry, and other public and private organizations (whether for profit or nonprofit). It is anticipated that an institution of higher education will serve as the lead institution.

Cognizant Program Officer(s):

- Elementary, Secondary, and Informal Education Centers: Dr. John Bradley, Division of Elementary, Secondary, and Informal Education, Room 885, telephone: (703) 292-5091, e-mail: ehr-esi-centers@nsf.gov.
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- Higher Education Centers: Dr. Bruce Kramer, Division of Engineering Education and Centers, Room 585, telephone: (703) 292-5348, e-mail: bkramer@nsf.gov.
- Higher Education Centers: Dr. Henry Blount, Directorate for Mathematics and Physical Sciences, Room 1005, telephone: (703) 292-8803.

Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):

- 47.076 --- Education and Human Resources

ELIGIBILITY INFORMATION

- **Organization Limit:**

An institution may only be the administrative home for one Center proposal. Cost-sharing is required for all proposals submitted in response to this solicitation at a level of 10% of the requested total amount of NSF funds. However, an institution or agency may be a partner on more than one CLT.

- **PI Eligibility Limit:** None

- **Limit on Number of Proposals:** An institution or agency may serve as administrative home for only one CLT proposal. However, an institution or agency may be a partner on more than one CLT proposal.

AWARD INFORMATION

- **Anticipated Type of Award:** Continuing Grant
- **Estimated Number of Awards:** 3 awards for Centers with a focus on elementary, secondary, or informal education; and up to 2 awards for Higher Education Centers.
- **Anticipated Funding Amount:** Approximately \$2 million will be allocated per year per Center for up to 5 years, pending availability of funding.

PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

- **Preliminary Proposals:** Submission of Preliminary Proposals is required. Please see the full program announcement/solicitation for further information.
- **Full Proposals:** Supplemental Preparation Guidelines
 - The program announcement/solicitation contains supplements to the standard Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full program announcement/solicitation for further information.

B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is required (Percentage).
- **Cost Sharing Level/Amount:** 10 % of total request (direct plus indirect costs).
- **Indirect Cost (F&A) Limitations:** None.
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full program announcement/solicitation for further information.

C. Deadline/Target Dates

- **Letters of Intent (*optional*):** None
- **Preliminary Proposals (*required*):** March 15, 2002
- **Full Proposal Deadline Date(s):** May 3, 2002

D. FastLane Requirements

- **FastLane Submission:** Required
- **FastLane Contact(s):**
 - For Elementary, Secondary, and Informal Education Centers: Mr. Jeffery Harris, Elementary, Secondary, and Informal Education, telephone: (703) 292-8620, e-mail: jharris@nsf.gov.
 - For Higher Education Centers: Ms. Antoinette Allen, Division of Undergraduate Education, telephone: (703) 292-8670, e-mail: duefl@nsf.gov.
 - Fastlane Help Desk, telephone: (800) 673-6188, e-mail: fastlane@nsf.gov.

PROPOSAL REVIEW INFORMATION

- **Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full program announcement/solicitation for further information.

AWARD ADMINISTRATION INFORMATION

- **Award Conditions:** Additional award conditions apply. Please see the program announcement/solicitation for further information.
- **Reporting Requirements:** Additional reporting requirements apply. Please see the full program announcement/solicitation for further information.

I. INTRODUCTION

The Centers for Learning and Teaching (CLT) program is a comprehensive, research-based effort that addresses critical issues and national needs of the science, technology, engineering, and mathematics (STEM) instructional workforce across the entire spectrum of formal and informal education.

The need to replace a large number of educators who are expected to retire over the next decade is widely understood and recent studies have indicated that many inadequately prepared educators enter the profession each year. Recent reports also indicate that the doctoral-level professionals needed to educate the K-12 instructional workforce are in short supply, that faculty development opportunities are needed for STEM faculty, and that STEM graduate programs should be redesigned to prepare students for their professional roles as teachers of undergraduates. Replenishing and diversifying the instructional workforce, K-16, and conducting ongoing research related to learning and teaching across the spectrum of these activities are clear national needs.

A. Elementary, Secondary, and Informal Education Centers

A growing body of research articulates both the needs of, and possible solutions to, the current state of science, technology, engineering, and mathematics (STEM) education. *What Matters Most: Teaching for America's Future* (National Commission on Teaching and America's Future, 1996) indicates that over 50,000 inadequately prepared teachers enter the teaching profession each year. Indeed, a recent report indicates that in grades 7-12, approximately 33% of mathematics teachers and 20% of science teachers have neither a major nor minor in their field; yet these under qualified teachers teach over 26% of mathematics students and over 16% of science students (Ingersoll, 1999). Moreover, of those teachers who enter with adequate backgrounds, 30% to 50% are likely to leave the profession within five years. Many of those teachers teach science, mathematics, engineering, and technology.

At a time when the K-12 student population is becoming increasingly diverse, the K-12 instructional workforce has not diversified appreciably nor has its ability to provide appropriate instruction for diverse learners increased. For example, although research indicates that minority students' attitudes about and/or perceptions of science are positively influenced by teaching strategies that involve interactive, stimulating laboratory experiences in a non-competitive environment (Brownstein & Destino, 1994; Griffard & Wandersee, 1998; Teel, Debruin-Parecki, & Covington, 1998), too often lecture and factual memorization are the instructional strategies used. It is anticipated that Centers will use varied approaches to diversify the instructional workforce as well as to prepare teachers and faculty to use instructional techniques that enhance the STEM learning of all students.

Recent studies have identified a positive relationship between the use of teaching practices based on national standards and improved student learning (Cohen & Hill, 1998; Kahle, Meece, & Scantlebury, 2000; Klein, Hamilton, McCaffrey, Stecher, Robyn, & Burroughs, 1999). Further, the efficacy of combining professional development with standards-based curriculum is becoming evident (Weiss, Montgomery, Ridgway, & Bond, 1998). There is a need to couple this emerging knowledge base with new and effective ways of preparing future teachers and of providing professional development for current teachers that will produce, as well as retain, effective teachers at the elementary and secondary levels (U.S. Department of Education, 2000).

Teacher Education Component

An evolving body of research on models of effective professional development (e.g., Loucks-Horsley, Hewson, Love, & Stiles, 1998) provides the basis for the first Center program component, teacher education. Effective pre-service and in-service teacher professional development will enhance the capacity of the K-12 instructional workforce, add to the knowledge base about effective teacher education, and lead to documented improvement in student achievement. Exploring technology both to enhance instruction for K-12 students and as a means of providing professional development of, and support for, teachers is a high priority for NSF. The research on successful teacher professional development is applicable in teacher preparation, as well as during the induction periods for new teachers; programs addressing those areas will reflect this research and include high quality undergraduate courses in science, mathematics, engineering, and technology that are taught through research-validated models (e.g., extended inquiry, problem-solving). Other topics of high priority for NSF include: under-prepared and out-of-field teachers; retention of qualified teachers in the profession; strategies for assisting formal and informal educators to meet the needs of all learners; teachers prepared for varied roles within the instructional workforce (e.g., master teachers, department chairs); and opportunities for collaboration with informal science education as well as the education of informal science educators.

Graduate, Post-Doctoral, and Internship Component

Another critical CLT component is to provide graduate, post-doctoral, and intern programs for the broad array of professionals who educate and support the K-12 instructional workforce. These professionals form the infrastructure of STEM education. They include university scientists, mathematicians and/or engineers who prepare future teachers either in discipline or education courses, local and state supervisors and curriculum coordinators, informal science educators, education researchers, curriculum developers, and assessment and evaluation professionals. Regardless of their future roles, these professionals must master their disciplines; be knowledgeable about current reforms, assessment issues, and effective uses of technology; and be expert at translating research findings into educational practice. They need to understand national and state standards and know how to connect the goals of mathematics, science, engineering, and technology education to classroom practices that lead to enhanced student achievement. They should understand the research base for both student learning and teacher education and know how to help teachers internalize critical elements of that research into instruction. Moreover, they should be able to relate their expertise to curricular and instructional issues in K-12 STEM education.

Therefore, Elementary, Secondary, and Informal Education Centers for Learning and Teaching will educate these professionals in the context of educating the current K-12 instructional workforce. It is anticipated that the partnerships required for each Center will provide learning laboratories for these tasks, and that the work of each Center will complement rather than duplicate other CLTs in meeting national needs.

B. Higher Education Centers

In addressing all sectors of the STEM education infrastructure, Centers for Learning and Teaching may focus on undergraduate education to ensure faculty are knowledgeable and skilled in bringing STEM literacy to all students as well as providing the foundation for successful careers in the STEM workforce. Developing STEM faculty who will model best practices as they teach the next generation of K-12 teachers provides an essential key to the improvement of K-12 education. Ethnographic studies of undergraduates who switched from STEM majors indicate widespread dissatisfaction with lower division STEM courses and the quality of teaching (Seymour & Hewitt, 1994) as key factors in influencing the decision to abandon STEM disciplines. Typically, new faculty receive minimal or no training in the practice of teaching during their graduate or post-doctorate years, yet assume responsibility for teaching the introductory STEM courses that will influence undergraduates' career decisions and attitudes toward STEM. While the percentage of recent science and engineering doctorates in full time faculty positions who reported teaching as the primary responsibility declined from 78% to 56% from 1973 to 1980, this trend was reversed in the last decade with 68% reporting teaching as their primary responsibility in 1997 (National Science Board, 2000).

The Boyer Commission on Educating Undergraduates called for redesigning graduate education to prepare students for their professional roles as teachers of undergraduate students, beginning at the teaching assistant level (Boyer Commission on Educating Undergraduates in the Research University, 1998). The National Research Council's (NRC) Committee on Undergraduate Science Education (CUSE), in carrying out its charge to seek ways to improve science literacy for all undergraduates, recommended programs that provide graduate and post-doctoral students with the pedagogical skills needed to effectively teach undergraduates (CUSE, 1999). The Council of Graduate Schools and the Association of American Colleges and Universities recognized the need for professional development for the next generation of faculty by establishing the Preparing Future Faculty program to prepare doctoral students for academic careers engaged in teaching, research, and service (Gaff, Pruitt-Logan, & Weibl, 2000). Future faculty must be equipped to integrate research with education, develop courses and curricula based on effective approaches to teaching, and evaluate their efforts. College and university faculty are expected to serve as mentors, facilitators of learning, and collaborators across disciplines. Discipline-based learning and teaching Centers will provide resources to faculty to support career-long professional development of teaching skills and research in undergraduate STEM education.

II. PROGRAM DESCRIPTION

Program Description Contents

A. Goals

- 1. Elementary, Secondary, and Informal Education Centers**
- 2. Higher Education Centers**

B. Project Characteristics

- 1. Elementary, Secondary, and Informal Education Centers**
 - a. Focus**
 - b. Coverage**
 - c. Teacher Education Component**
 - d. Graduate, Post-Doctoral, and Internship Component**
 - e. Institutionalization**
 - f. Evaluation**
 - g. Dissemination**
 - 2. Higher Education Centers**
 - a. Focus**
 - b. Coverage**
 - c. Faculty Professional Development**
 - d. Graduate and Post-Doctoral Programs**
 - e. Institutionalization**
 - f. Evaluation**
 - g. Dissemination**
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A. GOALS

The CLT program calls for a systemic approach to the development and enhancement of the instructional workforce (K through graduate school) where professionals are educated in an environment of research and practice. For STEM educators, a Center will provide opportunities to enhance their content knowledge, develop teaching strategies that lead to improved student learning, implement high quality instructional materials, incorporate information technology, and develop skills in using various strategies for assessing student learning. For graduate students, post-doctoral students, and interns, a Center will provide study and research opportunities with the goal of improving learning, teaching, and assessment across the educational continuum.

1. Elementary, Secondary, and Informal Education Centers

Although Centers will develop different models to achieve their objectives, all will be expected to address the following equally important goals that are based upon documented national needs.

- Centers will increase significantly the numbers of K-12 STEM educators in formal (schools) and/or informal (museums, zoos, botanical gardens, etc.) settings who have current content knowledge in their disciplinary area and who are prepared to implement standards-based instruction and new assessment strategies. Further, these educators will be able to use information technology as an aid to student learning.
- Centers will rebuild and diversify the human resource base that forms the national infrastructure for STEM education. This component will involve providing basic and advanced education for graduate and post-doctoral students who will specialize in STEM education (either in disciplinary or education departments); who will provide the expertise for large-scale assessment and/or evaluation of educational reform; who will conduct research on STEM teaching and learning; who will develop the next generation of curricular materials; or who will develop future directions in informal science education.
- Centers will provide substantive opportunities for research into the nature of learning, strategies of teaching, policies of educational reform, and outcomes of standards-based reform.

The three goals are synergistic and inter-related; that is, a Center's research agenda, teacher education activities, and graduate programs should inform each other and focus on the Center's documented national needs.

2. Higher Education Centers

Regardless of specific focus area, all Centers will be expected to address the following goals as a coordinated and integrated effort:

- Centers will increase significantly the numbers of faculty from STEM disciplines who implement effective teaching practices and assessment strategies. These educators will integrate research with education and enable all undergraduate students to achieve science literacy.
- Centers will promote effective teaching as a professional responsibility of all faculty, building a national infrastructure for STEM undergraduate and graduate education. This component will involve providing professional development for graduate and post-doctoral students in STEM disciplines to develop their skills as educators as well as the development of graduate programs in STEM education in disciplinary departments to enable STEM faculty to engage in the scholarship of teaching through participation in assessment and/or evaluation of educational reform; research on STEM teaching and learning; and the development of educational materials.
- Centers will provide substantive opportunities for research into the nature of learning, strategies of teaching, policies and institutionalization of educational reform in higher education, and outcomes of undergraduate and graduate level educational reform.

B. PROJECT CHARACTERISTICS

1. Elementary, Secondary, and Informal Education Centers

a. Focus. In order to meet the overarching purposes of this solicitation, Elementary, Secondary, and Informal Education Centers will address the range of teacher education and will prepare STEM education professionals through doctoral programs or by providing post-doctoral and internship opportunities for individuals drawn either from a STEM discipline or from education. The teacher education and graduate/post doctoral components will be developed and carried out through appropriate collaborations between STEM disciplinary and STEM education faculty. The goal of each Center will be on connecting teacher education with the education of those who will be prepared to assume national roles in education. It is anticipated that each Center's focus will address a national need in STEM education and that evidence addressing the scope and urgency of a particular need will be included in the proposal. Because each CLT must address national needs, proposals should include an explanation detailing the uniqueness of the proposed Center vis-à-vis existing Centers. Descriptions of currently funded Centers can be viewed at www.ehr.nsf.gov/ehr/esie. Teacher education is likely to be an ongoing activity of the collaborating institutions, and undergraduate and graduate students as well as interns should have opportunities to develop their expertise through interactions with the teachers participating in those activities.

b. Coverage. Centers may address mathematics, science, and/or technology education. Each proposal must contain a rationale for the grade band (e.g., K-12, K-6, 7-12) chosen for emphasis. Centers will include educational opportunities for substantial numbers of teachers, administrators, and/or informal science educators as well as programs of study for doctoral and/or post-doctoral students (including those with discipline-based degrees). Proposals should be developed cooperatively among several institutions of higher education and should include some combination of state or local education agencies, community colleges, museums, etc. Such cooperation should leverage the expertise of different institutions. Collaboration is encouraged also with international institutions. Doctoral students, post-doctoral students, and interns might complete different parts of their education at different institutions and/or Centers in order to develop special expertise. Proposals should demonstrate how the proposed CLT would have a unique and important focus while not duplicating efforts of existing Centers.

For example, one type of Center might focus on developing a new generation of curriculum developers knowledgeable in applications and uses of new technologies, and knowledgeable of the latest research in cognition and assessment. Such an effort might bring together representatives from school districts, informal science centers, curriculum developers, undergraduate, graduate, and post-doctoral students, and STEM faculty to design, develop, and field-test prototype materials developed using new paradigms. Another type of Center might focus on research, evaluation, and assessment through emphasis on the graduate education of educational psychologists and psychometricians who focus on the learning and assessment of mathematics and/or science and who are needed to evaluate large-scale reform projects such as the STEM systemic initiatives. Another Center might choose to address the retraining of those who already hold a doctorate (or the equivalent) in science, mathematics, and engineering and who have particular interest in STEM education. Descriptions of currently funded Centers can be viewed at www.ehr.nsf.gov/ehr/esie.

Each Center proposal will present a clear plan for recruiting highly qualified candidates into teacher education programs, in-service activities, and graduate and post-doctoral level programs. Recruitment plans will include strategies for expanding the diversity of the STEM education workforce; these strategies should document and build upon existing effective efforts.

c. Teacher Education Component. Centers may address a wide range of issues in teacher education such as: teacher preparation, induction, and internships; teaching out-of-field; licensure programs; alternative certification, master's degree programs; distance education; or some combination of these topics.

Proposals will describe ways that teachers will be assisted in learning content and pedagogy in cooperation with scientists, mathematicians and engineers. Innovative uses of information technology are encouraged. Activities will go beyond standard courses or generic in-service activities, be based on national standards, and include effective pedagogy for adult learning. Innovative ways of providing ongoing support for participants are encouraged in the Centers and may involve collaborations with local or state educational agencies or electronic networks.

d. Graduate, Post-Doctoral, and Internship Component. A wide variety of people provide educational opportunities for the STEM instructional workforce. They include university teacher educators; scientists, mathematicians, and engineers; curriculum developers; district-level or state-level supervisors and coordinators; lead teachers; informal science educators; assessment specialists; and school administrators (e.g., principals). Programs of study for these professionals will include clearly delineated graduate programs (M.S., Ph.D., or Ed.D.). Proposals will have clear statements of focus, indicating what backgrounds and experiences will be required for entrance and discuss how the program of study might be adapted for applicants with varying kinds of backgrounds. New ways to involve each Center's collaborative partners, as well as collaborations across Centers as the CLT program evolves are encouraged.

Innovation in graduate programs and post-doctoral education is encouraged as Centers seek to impact both the quantity and quality of the STEM education infrastructure. One or more of the following activities are envisioned. First, Centers will provide rich opportunities to conduct research and assessment studies in STEM learning and teaching. Second, for doctoral students, post-doctoral students, and interns coming from scientific, mathematics, and engineering disciplines, there will be in-depth experiences with K-12 STEM teaching, administration, assessment, and curricula. Third, for doctoral students, post-doctoral students and interns with education backgrounds, Centers will provide content courses and other learning experiences related to the Center's particular focus. Centers will provide professionals with opportunities to apply their developing knowledge in realistic settings and provide extensive mentoring to help them develop a broad network of contacts that will provide support after the program of study is complete.

e. Institutionalization. Proposals will include plans for ensuring continuation of critical aspects of the Centers after the period of NSF support. In particular, the support strategies for teacher education need to be institutionalized and critical aspects of graduate programs should be sustained by the collaborating institutions.

f. Evaluation. Evaluation of both the teacher education and graduate, post-doctoral, and internship components that will provide formative and summative feedback to revise and refocus a Center is required. The evaluation plan must describe the data that will be collected, benchmarks that will be measured, methods that will be used in evaluating the project, and the timeline for the evaluation process. It is expected that data will be collected that are appropriate to the goals of the Center and of the CLT program. The evaluation should document the Center's effect on students, teachers, graduate students, faculty, policy environment, etc.

Each proposed Center must commit to cooperating with an NSF third-party evaluation, including a longitudinal study of impact that will be funded independently by NSF. As part of this evaluation, Centers will be responsible for providing requested data to the program evaluator.

g. Dissemination. The proposal must include strategies and plans for communicating the activities and outcomes of the Center to other professionals in the STEM and education communities throughout and after the project.

2. HIGHER EDUCATION CENTERS

a. Focus. Higher Education Centers will address the range of issues related to teaching at institutions of higher education and will strengthen the infrastructure by focusing on future STEM faculty as they matriculate through graduate and post-doctoral programs in the disciplines and by preparing STEM education faculty through doctoral programs in STEM education within the discipline departments. The goal of each Center will be on connecting faculty professional development with the goal of providing an exemplary undergraduate STEM education for all students, including non-STEM majors. It is anticipated that each Center's focus will address a national need in STEM undergraduate education and that evidence addressing the scope and urgency of a particular need will be included in the proposal.

b. Coverage. Centers may address a particular discipline or sector of the undergraduate population, or encompass an institution-wide or multi-disciplinary approach. Each proposal must contain a rationale for the chosen emphasis. Centers will include long-term and short-term professional development for substantial numbers of faculty as well as programs of study for doctoral and/or post-doctoral students with discipline-based degrees. A Center might focus on undergraduate education in one or more STEM disciplines. Proposals should be developed cooperatively among several institutions of higher education and should include community colleges, businesses, and other agencies as appropriate. For example, a Center focusing on the undergraduate preparation of teachers should involve collaboration with school districts. Such cooperation should leverage the expertise of different institutions, offering a variety of sites as well as distance learning for participants based on individual needs. Collaboration is encouraged also with international institutions. Proposals should demonstrate how the proposed CLT would have a unique and important focus building on previous work in undergraduate education reform. For example, a Center might focus on curriculum development bringing together multidisciplinary faculty teams comprised of STEM discipline faculty, cognitive scientists, and educational researchers knowledgeable of the latest research in cognition and assessment. Each Center proposal will present a clear plan for using and contributing to research on the nature of learning, for engaging future and current faculty in professional development, and recruiting students into graduate and post-doctoral level programs in STEM education. Recruitment plans will include strategies for expanding the diversity of the STEM education workforce; these strategies should document and build upon existing effective efforts.

c. Faculty Professional Development. Centers may address a wide range of issues in faculty professional development such as: instructional strategies for improving student learning, teacher preparation, integrating research and education, distance education, and uses of technology in education.

d. Graduate and Post-Doctoral Programs. Innovation in graduate programs and post-doctoral education is encouraged as Centers seek to impact both the quantity and quality of the STEM education infrastructure. One or more of the following activities are envisioned. First, Centers will provide opportunities for graduate and post-doctoral students to prepare for their future roles as faculty, beginning with enhanced preparation of teaching assistants, by providing direct experiences with undergraduate STEM teaching and assessment, administration, service, and curriculum development. For doctoral and post-doctoral students in STEM education, centers will provide rich opportunities to conduct research and assessment studies in STEM learning and teaching. Centers will provide future faculty with opportunities to apply their developing knowledge in realistic settings and provide extensive mentoring to help them develop a broad network of contacts that will provide support after the program of study is complete.

e. Institutionalization. Proposals will include plans for ensuring continuation of critical aspects of the Center after the period of NSF support. In particular, the support strategies for professional development of future faculty need to be institutionalized and critical aspects of graduate programs should be sustained by the collaborating institutions.

f. Evaluation. The proposal must include plans for formative and summative evaluation of the project to measure the quality of the Center's activities, progress, and success in meeting goals, and the impact of the Center on the institutions, faculty, and students participating in the Center's activities. There should be documentation of changes in teaching practices and impact on student learning. The evaluation plan must describe the data that will be collected, benchmarks that will be measured, methods that will be used in evaluating the project, and the timeline for the evaluation process. Each proposed Center must commit to cooperating with an NSF third-party evaluation, including a longitudinal study of impact that will be funded independently by NSF. As part of this evaluation, Centers will be responsible for providing requested data to the program evaluator.

g. Dissemination. The proposal must include strategies and plans for communicating the activities and outcomes of the Center to other professionals in the STEM and education communities throughout and after the project.

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III. ELIGIBILITY INFORMATION

The categories of proposers identified in the [Grant Proposal Guide](#) are eligible to submit proposals under this program announcement/solicitation.

An institution may only be the administrative home for one Center proposal. Cost-sharing is required for all proposals submitted in response to this solicitation at a level of 10% of the requested total amount of NSF funds.

A. Elementary, Secondary, and Informal Education Centers

Elementary, Secondary, and Informal Education Center proposals must involve partnerships of organizations with a scientific, engineering, and/or educational mission. Among these are two- and four-year colleges and universities, state and local education agencies, professional societies, research laboratories, informal science centers, instructional materials development centers, private foundations, and/or other public and private organizations (whether for profit or nonprofit). Each Center must have one or more school district partners, as well as a partner that is authorized to award doctoral degrees in an appropriate area. Where possible, Centers should have collaborative relationships with NSF systemic initiatives (i.e., state, urban, rural, local).

B. Higher Education Centers

Higher Education Centers must involve partnerships that include at least one implementation site (two- or four-year college) and one partner must have authorization to grant STEM doctoral degrees. Other partners may include school districts, state and local education agencies, professional societies, research laboratories, private foundations, informal science education centers, business and industry, and other public and private organizations (whether for profit or nonprofit). It is anticipated that an institution of higher education will serve as the lead institution.

IV. AWARD INFORMATION

Under this solicitation, Center proposals may be submitted for up to five years of funding. Support levels for graduate and post-doctoral students and interns may vary depending upon the academic background and/or teaching expertise of applicants. It is envisioned that some advanced students will be paid academic-year stipends (in accordance with local institutional rates) plus tuition and fee waivers, while experienced professionals from teaching or other fields may be remunerated in proportion to their current salaries (up to \$30,000/ten months) plus tuition and fee waivers. Professional development activities for teachers may offer stipends of up to \$75 per day, or provide tuition and fee waivers for graduate credits, or provide support for substitutes to permit the release of teachers during the school day. Although proposals may request funds for the development of new graduate courses in STEM education, the cost of delivering such courses may not be covered. Stipend and travel support for faculty professional development activities associated with Higher Education Centers may be offered at the discretion of the proposer, with due consideration for the desirability of demonstrating institutional commitment to the activities being conducted. All Centers will be required to (1) submit annual reports of progress and (2) participate in a reverse site visit before the third year of funding. Additionally, the ESI Centers will be required to (3) participate in an NSF evaluation of the Centers' program.

V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

A. Proposal Preparation Instructions

Preliminary Proposals:

A preliminary proposal is required for submission of a full Center proposal. The preliminary proposal must be submitted via FastLane. The Project Description may not exceed six pages and should explain how the proposed center will address the three goals articulated in the program solicitation, how these goals will be connected, who the primary partners are and what their roles are, and how the center will be managed. The budget should provide current estimates of costs by category; a cumulative budget is required, but year-by-year budgets are not necessary.

Full Proposal:

Proposals submitted in response to this program announcement/solicitation should be prepared and submitted in accordance with the general guidelines contained in the NSF *Grant Proposal Guide* (GPG). The complete text of the GPG is available electronically on the NSF Web Site at: <http://www.nsf.gov/cgi-bin/getpub?gpg>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

Additional review criteria described below should be addressed when preparing a proposal. Project Description may not exceed 20 pages. Submission by FastLane is required for both preproposals and full proposals.

Proposers are reminded to identify the program solicitation number (NSF-02-038) in the program announcement/solicitation block on the proposal Cover Sheet (NSF Form 1207). Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

B. Budgetary Information

Cost sharing at a level of 10 % of total request (direct plus indirect costs). percent of the requested total amount of NSF funds is required for all proposals submitted in response to this solicitation. The proposed cost sharing must be shown on Line M on the proposal budget. Documentation of the availability of cost sharing must be included in the proposal. Only items which would be allowable under the applicable cost principles, if charged to the project, may be included in the awardee's contribution to cost sharing. Contributions may be made from any non-Federal source, including non-Federal grants or contracts, and may be cash or in kind (see OMB Circular A-110, Section 23). It should be noted that contributions counted as cost sharing toward projects of another Federal agency may not be counted towards meeting the specific cost sharing requirements of the NSF award. All cost sharing amounts are subject to audit. Failure to provide the level of cost sharing reflected in the approved award budget may result in termination of the NSF award, disallowance of award costs and/or refund of award funds to NSF.

Indirect Cost (F&A) Limitations: None.

Other Budgetary Limitations:

Center awards will be made as continuing grants for up to five years. Other budget limitations are identified in section IV, **Award Information**.

C. Deadline/Target Dates

Proposals must be submitted by the following date(s):

Preliminary Proposals (*required*): March 15, 2002

Full Proposals by 5:00 PM local time: May 3, 2002

D. FastLane Requirements

Proposers are required to prepare and submit all proposals for this Program Solicitation through the FastLane system. Detailed instructions for proposal preparation and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call 1-800-673-6188 or e-mail fastlane@nsf.gov.

Submission of Electronically Signed Cover Sheets. The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see [Chapter II, Section C](#) of the Grant Proposal Guide for a listing of the certifications). The AOR must provide the required certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane website at: <http://www.fastlane.nsf.gov>.

VI. PROPOSAL REVIEW INFORMATION

A. NSF Proposal Review Process

Reviews of proposals submitted to NSF are solicited from peers with expertise in the substantive area of the proposed research or education project. These reviewers are selected by Program Officers charged with the oversight of the review process. NSF invites the proposer to suggest, at the time of submission, the names of appropriate or inappropriate reviewers. Care is taken to ensure that reviewers have no conflicts with the proposer. Special efforts are made to recruit reviewers from non-academic institutions, minority-serving institutions, or adjacent disciplines to that principally addressed in the proposal.

Proposals will be reviewed against the following general review criteria established by the National Science Board. Following each criterion are potential considerations that the reviewer may employ in the evaluation. These are suggestions and not all will apply to any given proposal. Proposers are reminded that both the intellectual merit and the broader impacts of the work to be accomplished should be addressed. While reviewers are expected to address both merit review criteria, each reviewer will be asked to address only considerations that are relevant to the proposal and for which he/she is qualified to make judgements.

What is the intellectual merit of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative and original concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

What are the broader impacts of the proposed activity?

How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, disability, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks, and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Principal Investigators should address the following elements in their proposal to provide reviewers with the information necessary to respond fully to both of the above-described NSF merit review criteria. NSF staff will give these elements careful consideration in making funding decisions.

Integration of Research and Education

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

Integrating Diversity into NSF Programs, Projects, and Activities

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

Additional Review Criteria

A. Elementary, Secondary, and Informal Education Centers

As elaboration to the above considerations, the following points will be used in evaluating all Elementary, Secondary, and Informal Education CLT proposals.

Institutional Capacity. What involvement has the proposing institution and its partners had in substantial, high quality STEM education programs? What is the expertise of the faculty and staff who will have involvement with the program? How does it relate to their role in Center activities? What are the plans for institutionalizing the Center?

Project Design. How does the design of the opportunities proposed for teachers and graduate and post-doctoral students reflect current understanding of high-quality professional development? Does the project design allow for differences in background knowledge and experience that participants will bring to the programs? How do scientists and mathematicians contribute to the project?

Impact. What is the likelihood that the activities will produce leaders who can impact STEM education? Will the recruitment and program activities enhance the diversity of the STEM workforce? What is the potential for the project to significantly strengthen the nation's formal and informal STEM instructional workforce, both at the K-12 and higher education levels?

Plan. What is the likelihood that the proposed project will achieve its goals? How will the plan improve the disciplinary content knowledge and instructional skills of STEM teachers and faculty? Is the project informed by research in teaching and learning? Do the proposed activities address and promote equity and diversity in the STEM workforce? Are plans for dissemination and sustainability adequate?

Cooperative Relationships. Are the working relationships among collaborating parties strong? How will collaborations be strengthened as the project progresses?

Research. Are the research findings at the Center used to inform and improve student learning and teaching practice in the Center's specific focal area? Does the research add in a coherent way to the body of knowledge about STEM learning, teaching, assessment, policies, teacher preparation/professional development, uses of information technology, etc.? Will the research findings be disseminated in a comprehensive way? Will the research address issues of equity and diversity in STEM education?

Evaluation. Are the goals of the project clearly stated and measurable? Will the evaluation plan provide data on the impact of the project, on participants' knowledge of content and pedagogy, on the quality of instruction for students or teachers, on the effectiveness of graduate students in improving mathematics and science education, and on the enhancement of K-12 student learning?

B. Higher Education Centers

As elaboration to the above considerations, the following points will be used in evaluating all prototype Higher Education CLT proposals.

Institutional Capacity. What involvement has the proposing institution and its partners had in significant, high quality STEM undergraduate and graduate education programs? What is the expertise of the faculty and staff who will have significant involvement with the program? Do the institutions have a demonstrated record of leadership in the area of education reform? What are the plans for institutionalizing the Center? Is there evidence of institutional endorsement of the project?

Project Design. How does the design of the opportunities proposed for faculty and graduate and post-doctoral students reflect current understanding of high-quality professional development? Does the project design consider the individual expertise and capabilities of the partners?

Impact. What is the likelihood that the activities will significantly impact STEM higher education at a national level? Will the recruitment and program activities enhance the diversity of the STEM workforce? What is the potential for the project to significantly strengthen the Nation's STEM instructional workforce, both at the K-12 and higher education levels?

Plan. What is the likelihood that the proposed project will achieve its goals? How will the plan improve the disciplinary content knowledge and instructional skills of STEM faculty? Is the project informed by research in teaching and learning? Do the proposed activities address and promote equity and diversity in the STEM workforce? Are plans for dissemination and sustainability adequate?

Cooperative Relationships. Are the working relationships among collaborating parties strong? Are the specific roles of the collaborating parties clearly defined? How will collaborations be strengthened as the project progresses?

Research. Are the research activities well coordinated with the overall focus of the Center? Are research findings at the Center used to inform and improve student learning and teaching practice in the Center's specific focal area? Does the research add in a coherent way to the body of knowledge about STEM learning, teaching, assessment, policies, teacher preparation, professional development, uses of informational technology, etc.? Will the research findings be disseminated in a comprehensive way? Will the research address issues of equity and diversity in STEM education?

Evaluation. Are the goals of the project clearly stated and measurable? Are plans for evaluation appropriate and adequate to inform project implementation and to provide evidence of the project's success in meeting goals? Will the evaluation plan provide data on the impact of the project on institutions, on participants' pedagogical practices, on the quality of instruction in higher education, on the effectiveness of graduate students in improving mathematics and science education, and on the enhancement of student learning?

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Director. In addition, the proposer will receive an explanation of the decision to award or decline funding.

B. Review Protocol and Associated Customer Service Standard

All proposals are carefully reviewed by at least three other persons outside NSF who are experts in the particular field represented by the proposal. Proposals submitted in response to this announcement/solicitation will be reviewed by Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

In most cases, proposers will be contacted by the Program Officer after his or her recommendation to award or decline funding has been approved by the Division Director. This informal notification is not a guarantee of an eventual award.

NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months for 70 percent of proposals. The time interval begins on the date of receipt. The interval ends when the Division Director accepts the Program Officer's recommendation.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at its own risk.

VII. AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See section VI.A. for additional information on the review process.)

B. Award Conditions

An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (NSF-GC-1)* or Federal Demonstration Partnership (FDP) Terms and Conditions;* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreement awards also are administered in accordance with NSF Cooperative Agreement Terms and Conditions (CA-1). Electronic mail notification is the preferred way to transmit NSF awards to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

*These documents may be accessed electronically on NSF's Web site at http://www.nsf.gov/home/grants/grants_gac.htm. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (301) 947-2722 or by e-mail from pubs@nsf.gov.

More comprehensive information on NSF Award Conditions is contained in the NSF *Grant Policy Manual* (GPM) Chapter II, available electronically on the NSF Web site at <http://www.nsf.gov/cgi-bin/getpub?gpm>. The GPM is also for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, DC 20402. The telephone number at GPO for subscription information is (202) 512-1800. The GPM may be ordered through the GPO Web site at <http://www.gpo.gov>.

Special Award Conditions

Compliance with NSF third-party evaluation, as described under **Project Characteristics** in Section II.

C. Reporting Requirements

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period.

Standard annual reports are to be submitted via FastLane, with the possibility of requests for additional data. Such requests will be set as conditions to either the initial award or to continuing yearly funding.

Within 90 days after the expiration of an award, the PI also is required to submit a final project report. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

NSF has implemented an electronic project reporting system, available through FastLane. This system permits electronic submission and updating of project reports, including information on project participants (individual and organizational), activities and findings, publications, and other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system.

VIII. CONTACTS FOR ADDITIONAL INFORMATION

General inquiries regarding Centers For Learning and Teaching: should be made to:

- Elementary, Secondary, and Informal Education Centers: Dr. John Bradley, Division of Elementary, Secondary, and Informal Education, Room 885, telephone: (703) 292-5091, e-mail: ehr-esi-centers@nsf.gov.
- Elementary, Secondary, and Informal Education Centers: Dr. Michael Haney, Division of Elementary, Secondary, and Informal Education, Room 885, telephone: (703) 292-5102, e-mail: ehr-esi-centers@nsf.gov.
- Elementary, Secondary, and Informal Education Centers: Dr. Janice Earle, Division of Elementary, Secondary, and Informal Education, Room 885, telephone: (703) 292-5097, e-mail: ehr-esi-centers@nsf.gov.
- Elementary, Secondary, and Informal Education Centers: Dr. Cheryl Mason, Elementary, Secondary, and Informal Education, Room 885, telephone: (703) 292-5117, e-mail: ehr-esi-centers@nsf.gov.
- Higher Education Centers: Dr. Joan Prival, Division of Undergraduate Education, Room 835, telephone: (703) 292-4635, e-mail: jprival@nsf.gov.
- Higher Education Centers: Dr. Roosevelt Johnson, Division of Human Resource Development, Room 815, telephone: (703) 292-4669, e-mail: ryjohnso@nsf.gov.
- Higher Education Centers: Dr. Kathleen Bergin, Division of Educational System Reform, Room 875, telephone: (703) 292-8628, e-mail: kbergin@nsf.gov.
- Higher Education Centers: Dr. Terry Woodin, Division of Graduate Education, Room 907, telephone: (703) 292-4657, e-mail: twoodin@nsf.gov.
- Higher Education Centers: Dr. Bruce Kramer, Division of Engineering Education and Centers, Room 585, telephone: (703) 292-5348, e-mail: bkramer@nsf.gov.

- Higher Education Centers: Dr. Henry Blount, Directorate for Mathematics and Physical Sciences, Room 1005, telephone: (703) 292-8803.

For questions related to the use of FastLane, contact:

- For Elementary, Secondary, and Informal Education Centers: Mr. Jeffery Harris, Elementary, Secondary, and Informal Education, telephone: (703) 292-8620, e-mail: jharris@nsf.gov.
- For Higher Education Centers: Ms. Antoinette Allen, Division of Undergraduate Education, telephone: (703) 292-8670, e-mail: duefl@nsf.gov.
- Fastlane Help Desk, telephone: (800) 673-6188, e-mail: fastlane@nsf.gov.

IX. OTHER PROGRAMS OF INTEREST

The NSF *Guide to Programs* is a compilation of funding for research and education in science, mathematics, and engineering. The NSF *Guide to Programs* is available electronically at <http://www.nsf.gov/cgi-bin/getpub?gp>. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter.

Many NSF programs offer announcements or solicitations concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices. Any changes in NSF's fiscal year programs occurring after press time for the *Guide to Programs* will be announced in the NSF [E-Bulletin](#), which is updated daily on the NSF web site at <http://www.nsf.gov/home/ebulletin>, and in individual program announcements/solicitations. Subscribers can also sign up for NSF's [Custom News Service](#) (<http://www.nsf.gov/home/cns/start.htm>) to be notified of new funding opportunities that become available.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Awardees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with Federal statutes, regulations and NSF policies, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF-supported projects. See the program announcement/solicitation for further information.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090, FIRS at 1-800-877-8339.

The National Science Foundation is committed to making all of the information we publish easy to understand. If you have a suggestion about how to improve the clarity of this document or other NSF-published materials, please contact us at plainlanguage@nsf.gov.

PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to applicant institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies needing information as part of the review process or in order to coordinate programs; and to another Federal agency, court or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Pursuant to 5 CFR 1320.5(b), an agency may not conduct or sponsor, and a person is not required to respond to an information collection unless it displays a valid OMB control number. The OMB control number for this collection is 3145-0058. Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to: Suzanne Plimpton, Reports Clearance Officer, Information Dissemination Branch, Division of Administrative Services, National Science Foundation, Arlington, VA 22230, or to Office of Information and Regulatory Affairs of OMB, Attention: Desk Officer for National Science Foundation (3145-0058), 725 17th Street, N.W. Room 10235, Washington, D.C. 20503.

OMB control number: 3145-0058.